REHABILITATION OF ELDERLY PEOPLE WITH HISTORY OF FALLS.

(A STUDY ON BALANCING EXERCISES)

DISSERTATION SUBMITTED TO THE

AWARD OF M.D (P.M.R) ONE TIME MEASURE

DISSERTATION WORK DONE BY

REGD NO: 20109008

DISSERTATION SUBMITTED AS PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE M.D (PHYSICAL MEDICINE AND REHABILITATION) ONE TIME MEASURE MAY 2011 TO THE TAMILNADU DR.MGR MEDICAL UNIVERSITY

CHENNAI - 600 032.

ACKNOWLEDGEMENT

With immense pleasure I wish to express my deep and sincere gratitude to my friend, philosopher, philanthropist and social activitist Dr.S.R.JANAKIRAMAN MBBS;D.ACC and Dr.Mrs.VIMALA JANAKIRAMAN MBBS;D.G.O“RAMACHANDRA HOSPITAL” – ERAL,THOOTHUKUDI Dt for their immense support, motivation and encouragement in all possible ways to complete this study on rehabitation of elderly persons with history of falls.

CONTENTS

LIST OF TABLES

LIST OF DIAGRAMS

LIST OF ANNEXURE

1. INTRODUCTION

2. NEED FOR THE STUDY

3. AIMS

&

OBJECTIVES

4. HYPOTHESIS

5. REVIEW OF LITERATURE

6. EPIDEMIOLOGY OF FALLS

7. COMPLICATION OF FALLS

8. BIOLOGY & PHYSIOLOGY OF AGING

9. BALANCE PROCESS

10. METHODOLOGY

11. ASSESSMENT

12. PROCEDURE

13. DATA COLLECTION

14. DATA ANALYSIS

&

INTERPRETATION

15. RESULTS

16. DISCUSSION

17. CONCLUSION

18. BIBLIOGRAPHY

TABLES

DIAGRAMS

ANNEXURES

1. INTROCUCTION :

Everybody falls Regardless of age, falling is a ubiquitous event experienced by all throughout life. Most falls, especially in children and young adult, are of minor consequences, are readily forgotten, and have no impact on subsequent function. Falls in the elderly, by contrast, are a major cause of morbidity and mortlity- the consequences often exterding far beyond minor injury to significant loss of functional independence and even death. The reason that falling becomes a major health hazard in person older than 65 is a result of the complex and poorly understood interaction of biomedical, physiological, psychosocial and environmental factor.

Falls, the leading cause of accidental death among older adults, are a serious clinical problem among adult over 65years of age. [1]Falls are costly and have potentially devastating physical, psychological, and social consequences. Nonfatal falls often lead to physical injury (eg, fractures), reduced levels of activity, loss of confidence, and altered lifestyle in elderly people.[2]

Over the past 20 years, a considerable amount of research has been conducted to determine the motor or sensory system function in order to understand the causes of falling and to create effective strategies to prevent falls in elderly people. Tang and woollacott [3]investigated agerelated changes in postural response to a forward slip. It was shown that

balance control was reduced in elderly people compared with young people. They exhibited longer onset latencies to distal muscle response, disruptions in the temporal organization of postural muscle response, and longer agonist/antagonist coactivation duration when they were given external threats to balance.[4] Moreover, it has been shown that balance deteriorates in elderly people when sensory inputs contributing to balance control are reduced.[5] This suppots the idea that balance depends on both motor and sensory system function. In recent years,however,it has become increasingly apparent that other neutral systems, including cognitive resources, may contribute to balance control.

Amongst elderly people bone fractures in relation to falls are a frequent phenomenon. These accidents are often associated with physical decline, negative impact on quality of life and reduce survival. Fall risk has been related to a number of factor such as history of falls, muscle weakness, gait deficit, use of assistive device, visual impairment, mobility impairment, fear of falling, cognitive impairment, depression, sedentary behavior, age, number of medications, psychotropic/cardiovascular medications, nutritional deficits, urinary incontinence, artritis,home hazards and footwear.[6]

The natural ageing process combined with inactivity can gradually lead to decreased physical performance with the result that many elderly are at increased risk of falling.[7] Several studies have found that interventions can reduce the fall rate in an elderly population.[8] Different

Interventions have been suggested ranging from initiatives to ensure a safer environment to specific methods of training of the individual.[9] Part of the deteroiration in physiological capacity seems to be due to a lack of stimulation and training and strength training have proven the most effective in relation to to reduction in fall incidence.

Falls are responsible for two- thirds of all unintentional injury deaths in older adults. Fear of falling affects confidence in performing daily activiuies, causing self-limitation and a less actives lifestyle. This results in muscle atrophy and los of strength, especially in the lower extremities, which exacerbates the risk for falls.

Although most falls involve multiple factors, causes of falling are often categorized into intrinsic (person) and extrinsic (environment) factors. Some example of intrinsic factors include balance impairment, neurological disorders, sensory deterioration, musculoskeletal disorders, postural hypotension, and medication use. Examples of extrinsic factors include ill-fitting footwear, poor lighting, slippery surfaces, and inappropiate furniture. Research shows that balance impairment is a major contributor to falling in elderly people. Elderly means those who are above 65yrs eld are 65-74yrs. Elder old are75-84 elder old are 85 and above

Common causes of falls (IDEAS)

ILLNESS (I)	DRUGS (D)	EVIORONMENT (E)	AGING (A)	SOCIAL LIFE STYLE (S)
Stroke Syncope Parkinson's diseases Dementia Delirium Depression Arvaritis	Benzodiazepines Anticholinergicdrugs Tricyclics Antipsychotics Petrussor anticholinergic Barbiturates	Poor lighting Unevensurface Slippery surface Abstacles(trip/fall) Poor weather Crime (Assualt)	Decreased Vision Strength Balance Reactionti me Motor control Hearing	Isolation Bed rest Exercise Nutrition Alcoholision Drug abuse Shoe style

`

Environmental hazards are the leading cause of falls; acconting for about 25 to 45 percent in most studies . gait disturbance and muscle weakness also are common causes .Dizziness, vertigo, drop attacks, postural hypotension, visual impairment, and syncope also are know to cause falls. The side effects of some medicines taken for depression, sleep problems, diabetes, heart conditios and high blood pressure can upset balance and make fall.[19]

Lower extremity muscle weakness is a significant risk factor for falls, increasing the odds of falling fourfold .3 A history of fall and gait or balance deficits increase the risk threefold. [20] other high-risk situations that can cause or contribute to falls are use of an assistive device, visual deficit, arthritis, impaired activites of daily living, depression, cognitive impairment, and age older than 80years.[21]

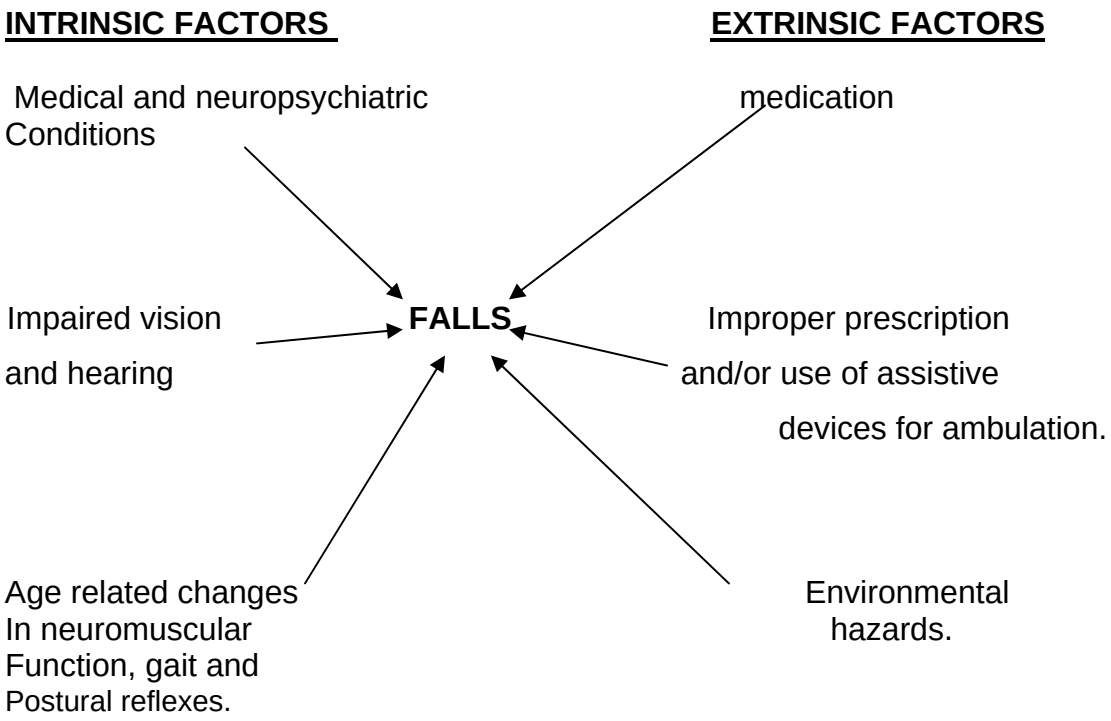
Use of four or more medications has been strongly associated with an increased risk of falls.[22] In particullar, use of psychotropic medications, cardiac drugs including class 1A antiarrhythmic agent, digoxin, diuretics, and anticonvulsants have been implicated in increasing the risk of falls. [23] A recent study showed benzodiazepine or antipsychotic medications was associated with a very high risk for falls. Careful selection in prescribing, continual review, and withdrawal of unnecessary medicstions may reduce the risk of falls.

The most important modifiable risk factor for falls in community- dwelling older adults are use of psychotropic drugs, polypharmacy,

Environmental hazards, poor vision, lower extremity impairments, and impairments in balance, gait and activities of daily living.[24]this array of contributing causes makes the prevention of falls complex,requiring a multidisciplinary approach.[25]

Most homes contain potential hazards, and many older people attribute their falls to trips or slip inside the home or immediate home surrounding. However , the existence of home hazards home alone is insufficient to cause falls, and the interaction between an older person's physical abilities and their exposure to environment stressors appear to be more important. Taking risk or impulsivity may further elevate falls risk. Some studies have found that environment hazards contribute to falls to a greater extent in older vigorous people than in older frail people.This appear to be due to increased exposure to falls hazards with an increase in the proportion of such falls occurring outside the home. There may also be a non-linear pattern between mobility and falls associated with hazards. Household Environmental hazards may pose the greatest risk for older people with fair balance; whereas those with poor balance are less exposed to hazards and those with good mobility are more able to withstand them. Reducing hazards in the home appear not to be an effective falls-prevention strategy in the general older population and those at low risk of falls. Home hazard reduction is effective if targeted at older people with a history of falls and mobility limitations. The effectiveness may depend on the provision of concomitant training for

Improving transfer abilities and other strategies for effecting behavior change.[26]



To prevent falls, it is necessary to intervene on factors associated with fragility. Methods include encouraging regular physical activity to improve equilibrium and muscle strength and the continuous monitoring of health status to prevent further deterioration. Moreover studies carried out in other countries have demonstrated that the multidisciplinary interventions targeted at persons who have already experienced a fall reduces their risk of further falls. These interventions consist of evaluations of visual acuity, balance, and gait and a review of clinical history with eventual modification of drug therapy and the environmental risks in the home. [27]

There are certain measures to reduce the risk of falling in older patients. These measures include exercise (particularly training to improve

balance), safety-related skills and behaviors, environmental hazard reduction, and monitoring and adjusting medications. An intensive individualized home-based multifactorial intervention for high-risk older patients is also recommended. Several studies have examined single risk-factor modification and multifactorial interventions, and have found that both can prevent falls older patients. [28]

Home safety assessment and modification. Home assessment and modification is likely to reduce the risk of falls by 20 percent with a group. The intervention was particularly effective in those with a history of falling. A recent systematic review also found that in patients with a history of falling, home hazard modification by a trained health professional reduced falls.[29]

Medication withdrawal. Withdrawal of psychotropic medications such as benzodiazepines, other sedatives or hypnotics, neuroleptic agents, or antidepressants resulted in a 66 percent reduction in risk of falling.

Cardiac pacemaker .patients with unexplained or recurrent falls who had cardioinhibitory carotid sinus hypersensitivity were randomized to dual-chamber pacemaker implantation or the standard treatment. The total number of falls at one year was reduced by two thirds.[31]

Hip protectors. Hip protectors are plastic shields or foam pads fitted in pockets within specially designed underwear.[32] they do not reduce the risk of falling, but aim to reduce the impact of a fall. The pads are

recommended for prevention of fractures for persons at high risk, of falls or those living in an institution. The reported adverse effects include skin irritation, abration, and local discomfort. Compliance with wearing hip protectors is low because many older patients find them uncomfortable.

Exercise and Physical therapy. Exercise programs such as progressive muscle strengthening, balance training, and a walking plan, etc., are the interventions that help in reducing the risk of falls. [33]for balance retaining, supporting inclusion of these exercises as a component of fall prevention programs found to have strong evidence.

A multifactorial evaluation followed by targeted intervention for identified risk factors is the most effective strategy for fall prevention. A systematic review of multidisciplinary, multifactorial health and environmental screening and intervention programs in community-dwelling older adults found a significant reduction in falls

The components of a successful multifactorial interventioninclude: exercise programs incorporating gait and balance training ; advice on appropriate use of assistive devices; review and modification of medications; evaluation and treatment of environmental hazards; and targeted medical and cardiovascular assessment and treatments. [34]

Falls and resulting injuries are more common among those in residential care facilities. Multifactorial intervention also have been Successful in preventing falls in these settings. Successful multifactorial interventions include: comprehensive individual assessment with specific safety recommendations targeting environmental and personal safety (e.g., improvement in room lighting, flooring, and footwear); wheelchair use; psychotropic drug use; exercises for strength, balance, transfer, and; ambulation provision and repair of aids; providing hip protectors; facility- wide educational programs; and post-fall problem-solving conferences.

The overall objective of the study is to provide an understanding of The complex issues in the evaluation and treatment of the older person With instability .This study is done to evaluate the effectiveness of balance training exercise in improving the balance in elderly and thereby reducing the risk of falls. The effects of these exercises in improving balance can be determined only at the end of the study.

2. NEED FOR THE STUDY:

A fall is a sudden, unintentional changes in position causing an individual to land at a lower level on an object, the floor, or the ground,Other than as a consequence of sudden onset of paralysis, epilepticSeizure or overwhelming external force.

The fact that many older persons have and these falls can result in injury that compromise health and quality of life is a well-Publicized problem.

Nowadays, due to modern medical interventions, the life expectancy has been increased resulting in more age related problems.

In today's world, 9% of the populations is Geriatric. Nearly two-thirds of the geriatric populations have balance problems in their life. It is the main cause for risk of falling, which may sometimes be very fatal.

Treatment used in the study is effective in improving the balance in Short duration and maintain functional ability. The treatment can be manually done to the patient without using any electrical equipment. The treatment plan can be varied according to the individual condition. Individual attention to the patient can be brought by the treatment.

The elderly patients with history of falls can be made to be more Active both physically and mentally by improving balance. Thus, the need for this study is to emphasize the effectiveness of balance training exercises to reduce the complications of balance disorders in elderly.

3. AIMS AND OBJECTIVES:

3.1. AIMS:

- The aim of this study is to improve balance and reduce Subsequent falls in geriatric patients with history of injurious falls.
- To investigate the circumstances and consequences of falls in the elderly and to correlate them for the treatment.
- The treatment technique mainly focuses to reduce the consequences of balance impairment in elderly by training them with balance exercises.

3.2. OBJECTIVES:

Falls are a frequent reason for hospitalization in short-stay geriatric units. Paradoxically, the factors determining such hospitalization are intrinsic factors. The syndrome of falls and fractures in later life reflects the Combined age- associated influences of cumulative susceptibility to health Problems and reduced adaptive reserve.

A fall in an older adult, especially if recurrent, may be a key signal of unmet medical need and should accordingly trigger an in-depth diagnostic process and clinical intervention by an appropriately skilled physical therapist.

The objective of this study was to determine the efficacy of balance training exercises to improve balance in the elderly with history of falls.

4. HYPOTHESIS:

4.1. NULL HYPOTHESIS:

H0-The balance training exercises are not effective in improving the balance in elderly with history of falls.

4.2. ALTERNATE HYPOTHESIS:

H1- The balance training exercises are effective in improving the balance in elderly and show-reduced risk of falls.

5. REVIEW OF LITERATURE:

1. Agostini J V, et al., from their prospective cohort study concluded that The clinicians should consider the adverse effects of total drug use and Not mereil the benefits or risks of individual medications for specific diseases.
2. Arai T, et al., in a research design evaluated the effects of short-term exercise intervention on falls self-efficacy and evaluate the relationship between baseline falls self efficacy and changes in physical function in older people.
3. Beauchet, et al., in a study aimed at identifying the explanatory factors of falls leading to acute-care hospitalization of elderly subjects emphasized that intrinsic factors are the most common
4. Bogle thorban L D, et al.,from a study, predicted that a very strong Specificity noted between increasing age and decreasing performance in the Berg Balance Test.
5. De bruin E D, et al., in their prospective cohort study evaluated the additional effect of functional exercises on balance and lower extremity function among hostel dwelling elderly people partaking in strength training.
6. Gazzola J M, et al., investigated the ciorcumstances and Consequences of falls in the chronically dizzy elderly and to correlate Them with the number of falls and found that the number of falls is

Significantly associated with activity restrictions after the cast fall and With the causes for falling.

7. Judge J O,et al., from a study determined that a vigorous program of Lower extremity strengthening, walking and postural control exercises would improve the single stance balance of healthy older women and Lower their risk of falls and fall associated injuries.

8. kalula S Z, et al., from a study determined management of older Patients presenting after a fall and emphasized that management Should include assessment and treatment of the injuries and assessment and correction of underlying risk factors in order to prevent recurrent falls.

9. Klaus hauer, et al., in a study determined the safety and efficacy of an exercise protocol designed to improve strength, mobility and balance and to reduce subsequent falls in 57 female geriatric patients and found significant reduction in the fall-related behavioral and emotional restriction.

10. krebs D E, et al., suggested that an intensive functional training Intervention results in strength improvement of comparable magnitude as those attained from strength training and that functional training also confers greater improvements in dynamic balance control and coordination while performing daily life tasks.

11. Lords S R, et al., in a study concluded that the home hazard reduction Is effective if targeted at older people with a history of falls and mobility limitations and the effectiveness may depend on the provision of concomitant training for improving transfer abilities and other strategies for effecting behavior change.

12. Mancini C, et al., from a study suggested that intervention on factors Associated with fragility is necessary to prevent falls.

13. Nachreiner N M, et al., aimed at describing the circumstances and consequences of falls reported by 263 community dwelling older women and found that these falls occurred while walking, carrying objects or reaching / learning.

14. Nnodim J O, et al., in their cohort study compared the effect of Combinrd Balance and Step Training (CBST) versus Tai Chi on Balance and stepping measures and concluded that CBST results in modest improvements in balance, stepping and have been prove to reduce falls.

15. Przybelzki R J,et al., emphasized an aggressive approach to falls Reduction including eliminating balance-altering medications, obtaining Sub-speciality and balance evaluation and requesting home safety Assessments.

16. Sadashiv Rasm Aggarwal, et al., investigated with 48 community dwelling older males that the age related changes in posture and gradual decrease in lower exrremity muscle strength increase risk of

falls in elderly

17. Shumway cook A, et al., in a study involving 105 community dweeling Older adults proposed that the multi-dimensional exercise program could improve balance and mobility function and reduce the likelihood for falls among them.
18. Shumway cook A, et al., in a research emphasized that the identification of patients with a high fall risk lead to an appropriate referral into a fall prevention program and it can be used to calculate change resulting from intervention.
19. Tadikonda Prathima, et al., in their recent research suggested various ways of prevention of falls in the elderly people and various ergonomic solutions are suggested to help to perform their ADL safely and independently.
20. Yaron Barak, et al,. in a study investigated changes in the kinematics of elderly people who experienced at least one fall showed less stable gait patterns compared with the non-fallers and concluded that increased variability of walking patterns may be an important gait risk factors in elderly people with a history of falls.

6. EPIDEMIOLOGY OF FALL IN THE ELDERLY:

A fall is a sudden, unintentional change in a position causing an individual to land at a lower level, on an object, the floor or the ground, other than as a consequence of sudden onset of paralysis, epileptic seizure or overwhelming external force.

From 1992 through 1995, 147 million injury-related visits were made to emergency departments. Falls were the leading cause of external injury, accounting for 24 percent of these visits. Emergency department visits related to falls are more common in children less than five years of age and adults 65 years of age and older .Compared with children, elderly persons who fall are 10 times more likely to be hospitalized and eight times more likely to die as the result of a fall.

Trauma is the fifth leading cause of death in persons more than 65 Years of age, and falls responsible for 70 percent of accidental deaths In persons 75 years of age and older . The elderly, who represent 12 percent of the population, account for 75 percent of the deaths from falls. The number of falls increases progressively with age in both sexes and all racial and ethnic groups. The injury rate for falls is highest among persons 85 years of age and older.

Annually, 1,800 falls directly result in death. Approximately 9,500 Deaths are associated with falls each year.

Elderly persons who survive a fall experience significant morbidity. Hospital stays are almost twice as long in elderly patients who are Hospitalized after a fall than in elderly patients who are admitted for Another reason . Compared with elderly persons who do not fall, those Who fall experience greater functional decline in activities of daily living(ADLs) and in physical and institutionalization.

Falls and concomitant instability can be markers of poor health and declining function .In older patients, a fall may be a nonspecific presenting sign of many acute illnesses, such as pneumonia, urinary tract infection or myocardial infraction, or it may be the sign of acute exacerbation of a chronic diseases .About one third (range: 15 to 44.9 percent)of community-dwelling elderly persons and u o to 60 percent of nursing home residents fall each year; one half of these “fallers” have multiple episodes. Major injuries, including head trauma, soft tissue injuries, fractures and dislocations, occur in 5 to 15 percent of falls in any given year. Fractures account for 75 percent of serious injuries, with hip fractures occurring in 1 to 2 percent of falls.

More than 90 percent of hip fractures are associated with falls, and most of these fractures occur in persons more than 70 years of age.[8]Hip fracture is the leading fall-related injury that results in hospitalization, with these hospital stays being significantly prolonged and costly. It is projected that more than 340,000 hip fractures will occur

in the year 2000, and this incidence is expected to double by the middle

of the 21st century.

Once fourth of elderly persons who sustain a hip fracture die within six months of the injury. More than 50 percent of older patients who survive hip fracture are discharged to a nursing home , and nearly one half of these patients are still in a nursing home one year later. Hip fracture survivors experience a 10 to 15 percent decreasr in life expectancy and a meaningful decline in overall quality of life.

Most falls do not end in death or result in significant physical injury. However, the psychological impact of a or near fall often results in a fear of falling and increasing self-restriction of activities. The fear of future falls and subsequent institutionalization often leads to dependence and increasing immobility, followed by functional deficits and a greater risk of falling.

6.1.statistics on Falling and the Elderly:

Falling and its resulting injuries are an important public health problem for older adults.The National safety Council estimates that persons over the age of 65 have the highest mortality rate (death rate) from injuries.Among older adults ,injuries cause more deaths than either pneumonia or diabetes. Falls account for about one-half of the deaths due to injury in the elderly.

Several epidemiological studies have looked at the rate of falls in the

Elderly at home , in outpatient settings and institutions.

- Among 65 year-old women nearly one in three(30 percent) will fall;

  after age 85,over half of women will suffer a fall.

- For men, the propotion that fall increases from 13 percent in the 65 to

  69 age group to a peak of 31 percent in the 80- to 84-year age group.

For those over the age of 85 there is aslight decrease.

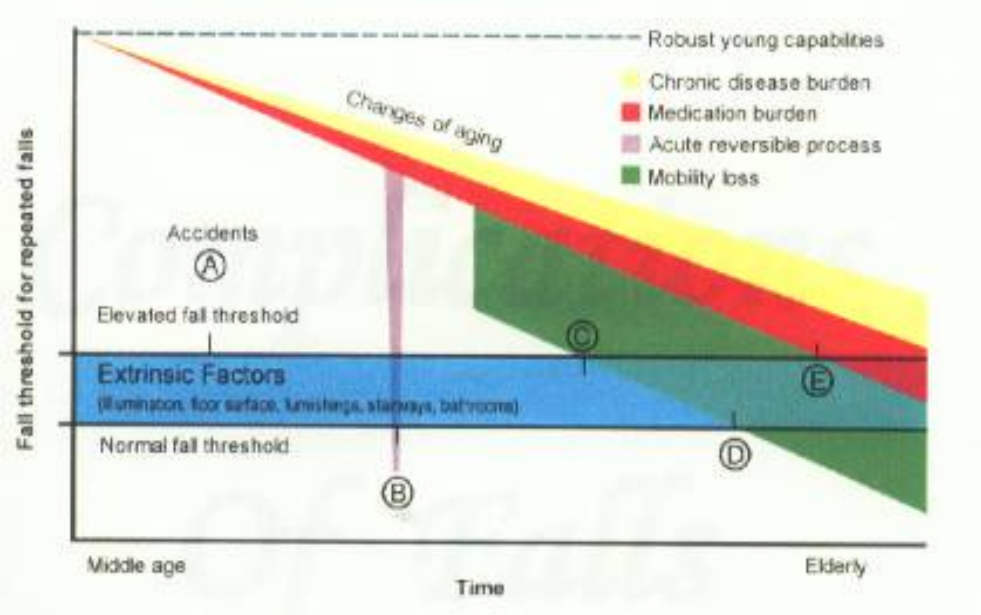
- It appears that for the elderly living at home one-third to –half tend to fall or do fall.Those who are more aged, female, single,divorced or widowed have an increased rate of falling.

- In the younger , healthier elderly, environmental factors are more important,with stairs and floor obstacles being comman causes of falls.

- For the older ,sick elderly, falls are often associated with dizziness and syncope (brief losss of consciousness; “passing out”),cardiac and neurologic disease, poor health stastus and functional disability.

FIGURE 1.

FACTORS THAT CONTRIBUTE TO THE RISK FALLS IN THE ELDERLY POPULATIONS



KEY:

A = Patient with an accidental fall and no intrinsic or extrinsic risk factors

B = Patient with acute illness.

C = Patient with moderate illness, loss of mobility and some prescription medications who falls because of an extrinsic factor.

D = Severely ill patient with many medications who falls even without extrinsic factors .

E = Elderly patient with numerous age-related changes who falls because of an extrinsic factor.

7.COMPLICATIONS OF FALLS:

The complications of falls are numerous and significant.

- Fear of falling can be a very real reason loss of mobility in the elderly. After a few falls, some people become so frightened and anxious that they will not attempt to stand even when there is adequate help and support. Fractures of the hip or forearm are common results of falling.

- Hip fracture carry high morbidity (health problems related to a disease or condition) because of prolonged immobility, surgical risks and functional disability, possibly related to hospitalization.

- Hypothermia , dehydration , bronchial pneumonia and pressure damage to the skin are all possible complications resulting from exposure in patients who are unable to get up once they have fallen. Older persons are likely to fall for several reasons. The environment can be particularly dangerous, as one gets older .Steps, throw rugs and poor lighting can all lead to increased falling when combined with physical instability. Physical instability has many causes in the elderly Osteoarthritis, muscle wasting and slowed reflexes are very Common poor vision from cataracts or macular degeneration and Postural hypotension also contributes to unsteadiness.

COMPLICATION OF FALLS IN ELDERLY

INJURIES.

- Painful soft tissue injuries
- Fractures
  - Hip
  - Femur
  - Humerus
  - Wrist
  - Ribs
- Subdural haematoma

HOSPITALIZATION.

- Complication of immobilization
- Risk of iatrogenic illness

DIABILITY.

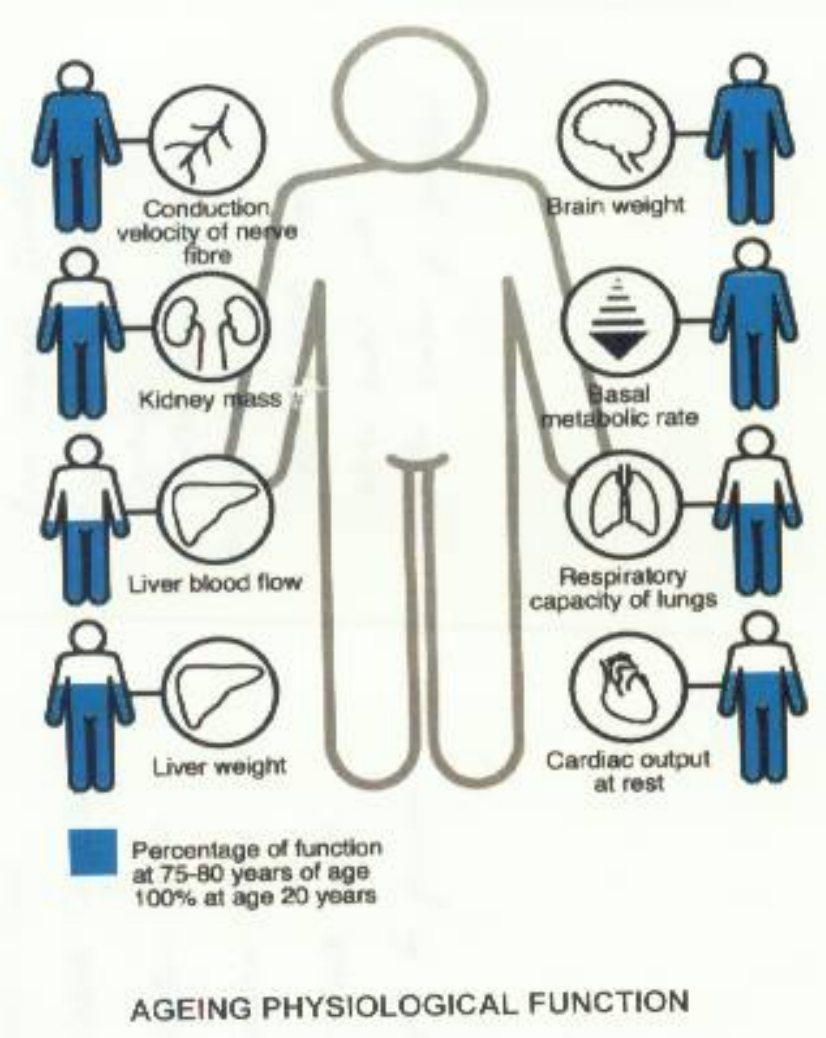
- Impaired mobility because of physical injury
- Impaired mobility from fear , loss of self-confidence and restriction of ambulation.

RISK OF INSTITUTIONALISATION.

DEATH.

8.1 AGEING PHYSIOLOGICAL FUNCTION:

There is an age-related decline in various physiological body processes, which are shown in the below figure.



AGEING PHYSIOLOGICAL FUNCTION

8.2 BIOLOGY AND PHYSIOLOGY AGING : (NEURO MUSCULO SKELETAL SYSTEM)

MUSCLE	BONE& JOINT&GAIT	NERUOUS SYSTEM
Decrease Muscle Oxidasave capacity Contrasion time Relaxation time Motor unit size Strength & power	Decrease in Bone mineral diversity Degonative arthritis Kyphosis Shorter step length Increase in Fernoral neck angle Wide base gait Water content of cortilase	Decrease in Nerve condition velocity Propriception Vibratiry save Visual scerty Suditory function Increase in Postural sway Reaction time Vestibular pathiology.

9. BALANCE PROCESS:

Balance is the ability to maintain the C.O.G within the B.O.S and to maintain or bring back when it moves out depending on the needs of the task and demands of the environment.

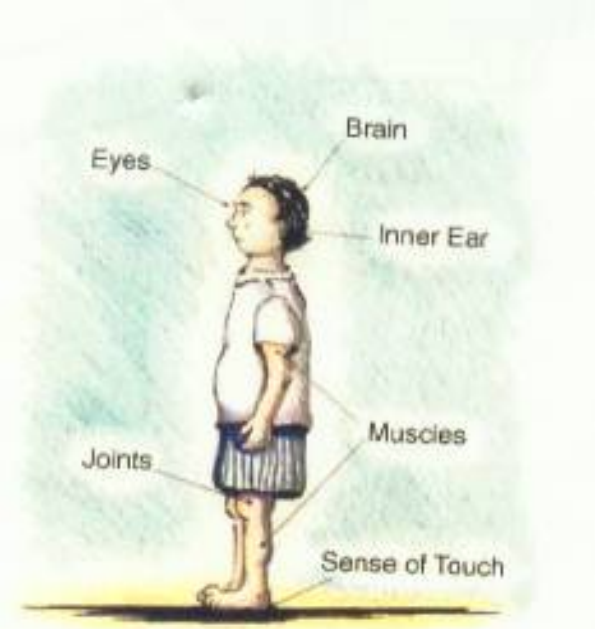
Ability to maintain balance is a complex process that depends on three major components;

(1) Sensory system for accurate information about your body's position relative to your environment;

(2) Brain's ability to process this information; and

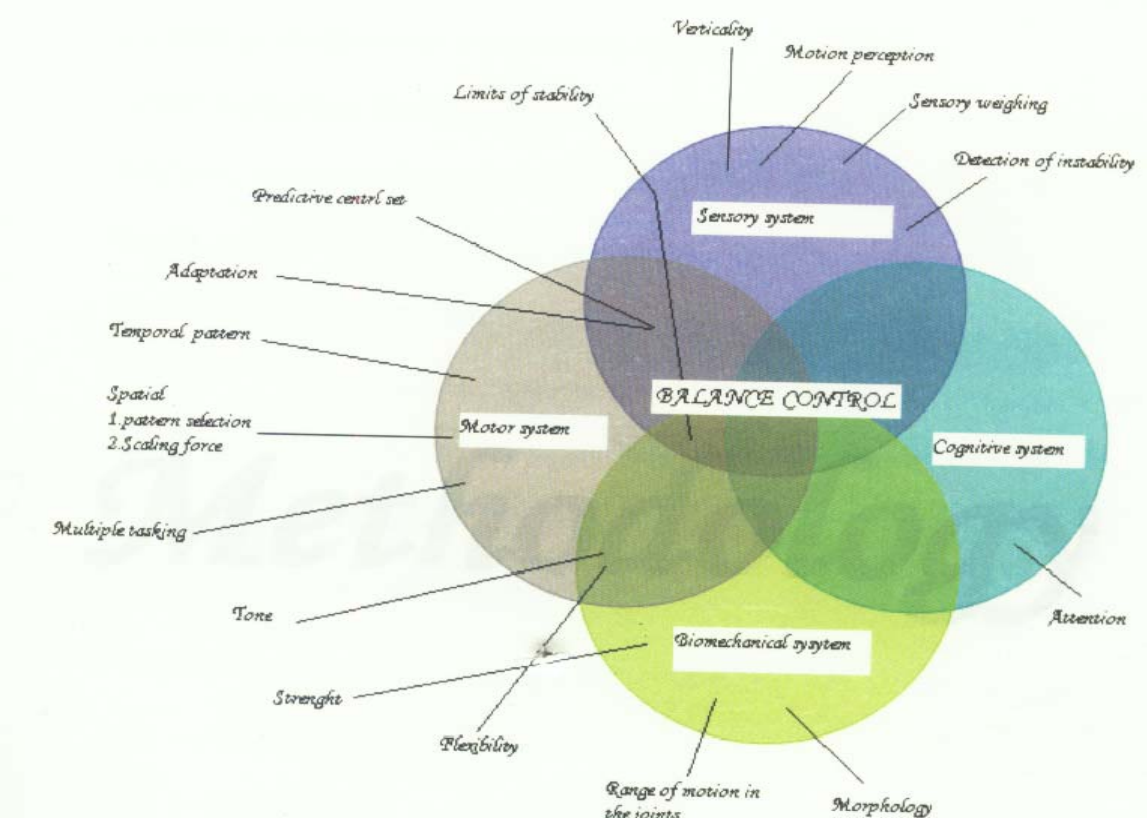
(3) Muscles and joints for coordinating the movements Required to maintain balance. The sensory systems Include your sense of touch (feet, ankles, joints), your Vision and your inner ear motion sensors. For example, we rely on our feet and joints to tell us if the surface we are standing on is uneven or moving. We rely on our eyes to tell us if the environment around us is moving or still. And we rely on our inner ears to tell us if we are upright or leaning ,or standing still or moving.

The balance system works with the visual skeletal systems (the muscle and joints and their sensors) to maintain orientation or balance. For example, visual signals are sent to the brain about the body's positioning relation to its surroundings. These signals are processed by the brain, and compared to information from the vestibular and the skeletal system. An example of interaction between the visual and vestibular system is Called the vestibular-ocular reflex. The nystagmus (an involuntary rhythmic Eye movement) that occurs when a person is spun around and then Suddenly stops is in example of avestibular-occur reflex.



Balance Sensors

Balance control



10.3. SAMPLE DESIGN:

Subjects selected based on inclusion and exclision criteria.

Subjects are selected by screening test using questionnaire.

Subjects with history of falls are differentiated from other conditions by using differential diagonistic tests.

After selecting the subjects,they have been put under simple random Sample technique and allotted into 2 groups.

Each group consists of 10 subjects .(n=10)

Total number of subjects taken is 20.(N=20)

Group 1: Received only counseling without any treatment.

Group 2: Subjects in group2 had been received balance training Exercises along with counseling.

10.4.RESEARCH DESIGN:

The study was done by an experimental research design of pre-test And post-test measurement.

The study was dne over the elderly subjects with history of falls.

10.5.DURATION OF THE TREATMENT

Treatment given for 2months continuously.

Two sessions per day.

Each session extends for half an hour.

10.6.TOOLS USED:

Berg Balance scale.

11. ASSESSMENT:

Older patients who repot a fall that is not clearly the result of an accidental trip or slip should be carefully evaluated even if the falls have not resulted in serious physical injury.

The pre assessment and post assessment were the same for both the groups and includes

1. Home Environmental Assessment.
2. Berg Balance scale.
3. Functional Strength test.
4. Modified Clinical test of Sensory Integration on Balance.

1. HOME ENVIRONMENT ASSESSMENT:

The common environmental hazards that can lead to falls in the elderly are

- ❖ Old, unstable and low lying furniture
- ❖ Beds and toilets of inappropriate height
- ❖ Unavailability of grab bars.
- ❖ Uneven stairs and inadequate railing
- ❖ Throw rugs, frayed carpets, cords, railing
- ❖ Slippery floors and bath tubs
- ❖ Inadequate lighting, glare
- ❖ Cracked and uneven side walks.

These hazards are to are assessed through histoy taking

2.BERG BALANCE SCALE:

Description:

14-item scale designed to measure balance of the older adult in a clinical setting.

Equipment needed:

Ruler.

2 standard chairs (one with arm rests, one without).

Footstool or step

Stopwatch or wristwatch.

15 ft walky way.

Completion:

Time: 15-20 minutes.

Scoring: A five point ordinal scale, ranging from 0-4. “0” indicates the lowest level of function and “4” the highest level of function.

Total score = 56.

Interpretation:

41-56 = low fall risk.

21-40 = medium fall risk.

0-20 = high fall risk.

ITEM DESCRIPTION:

1.SITTING TO STANDING:

INSTRUCTIONS: Please stand up. Try not to use your hand for

Support.

( ) 4 able to stand without using hands and stabilize independently.

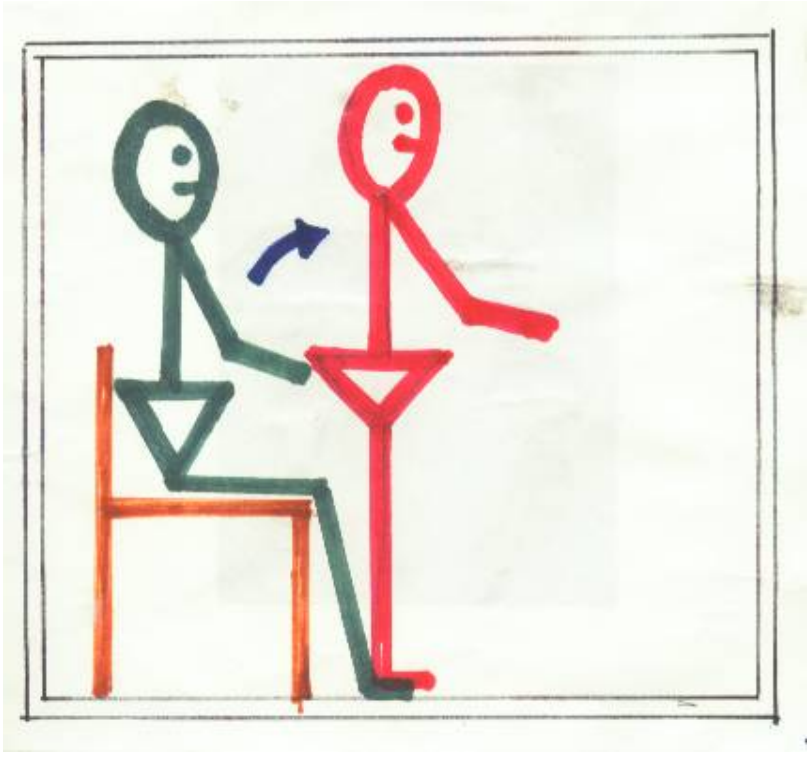
( ) 3 able to stand independently using hands.

( ) 2 able to stand using hands after several tries.

( ) 1 needs minimal aid to stand or stabililize.

( ) 0 needs moderate or maximal assist to stand.

SIT TO STAND



2.STANDING UNSUPPORTED:

INSTURCTION:Please stand for two minutes without holding on

( ) 4 able to stand safely for 2 minutes.

( ) 3 able to stand 2 minutes with supervision.

( ) 2 able to stand 30 seconds unsupported.

( ) 1 needs several tries to stand 30 seconds unsupported.

( ) 0 unable to stand 30 seconds unsupported.

3.SITTING WITH BACK UNSUPPORTED BUT FEET

SUPPORTED ON FLORR OR ON A STOOL:

INSTRUCTION:Please sit with arms folded for 2 minutes.

( ) 4 able to safely and securely for 2 minutes.

( ) 3 able to sit 2 minutes under supervision.

( ) 2 able to sit 30 seconds.

( ) 1 able to sit 10 seconds.

( ) 0 unable to sit without support 10 seconds.

4STANDING TO SITTING:

INSTRUCTION: Please sit down.

( ) 4 sit safely with minimal use of hands.

( ) 3 controls descent by using hands.

( ) 2 uses back of legs against chair to control descent.

( ) 1 sits independently but has uncontrolled descent.

( ) 0 needs assist to sit.

5.TRANSFERS:

INSTRUCTION: Arrange chairs(s) for pivot transfer.Ask subject to transfer one way toward a seat with armrests and one way towrd a seat without armrests. Two chairs (one with and way and one without armrests) or a bed and a chair may be used.

( ) 4 able to transfer safely with minor use of hands.

( ) 3 able to transfer safely definite need of hads.

( ) 2 able to transfer with verbal cuing and/or supervision.

( ) 1 needs one person to assit.

( ) 0 needs two people to assist or supervise to be safe.

6.STANDING UNSUPPORTED WITH EYES CLOSED:

INSTRUCTION:Please close your eyes and stnd still for 10 seconds.

( ) 4 able to stand 10 seconds safely.

( ) 3 able to stand 10 seconds with supervision

( ) 2 able to stand 3 seconds.

( ) 1 unable to keep eyes closed 3 seconds but stays safely.

( ) 0 needs help to keep from falling.

7. STANDING UNSUPORTED WITH FEET TOGETHER:

INSTRUCTION: Place your feet together and stand without holding.

( ) 4 able to place feet together independently and stand 1 minute safely.

( ) 3 able to place feet together independently and stand 1minute with supervision.

( ) 2 able to place feet together independently but unable to hold for 30 seconds.

( ) 1 needs help to attain position but able to stand 15 seconds feet together.

( ) 0 needs help to attain position and unable to hold for 15 seconds

8.REACHING FORWADING WITH OUTSTRETCHED ARM WHILE STANDING:

INSTRUCTION: Lift arm to 90 degrees. Stretch out your fingers and reach forward as far you can. (Examiner places a ruler at the end of fingertips when arm is at 90 degrees. Finger should not touch the ruler while reaching forward. The recorded measure is the distance forward that the fingers reach while the subject is in the most forward lean position. When possible, ask subject to use both arms when reaching to avoid rotation of the trunk.)

( ) 4 can reach forward confidently 25 cm(10 inches).

( ) 3 can reach forward 12 cm (5 inches).

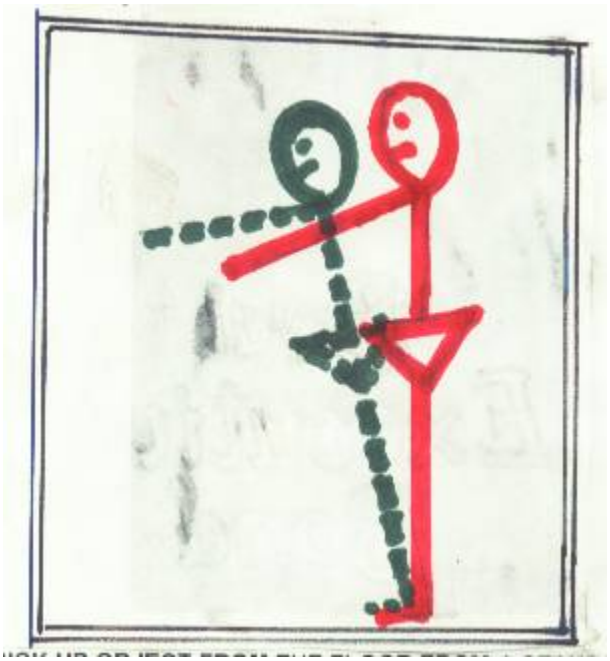
( ) 2 can reach forward 5 cm (2 inches).

( ) 1reaches forward but needs supervision.

( ) 0 loses balance while trying/requires external support .

REACHING FORWARD WITH OUTSTRETCHED ARM WHILE

STANDING



9.PICK UP OBJECT FROM THE FLOOR FROM A STANDING

POSITION:

INSTRUCTION:Pick up the shoe/slipper, which is place in front of

Your feet.

( ) 4 able to pick up slipper safely and easily.

( ) 3 able to pick up slipper but needs supervision.

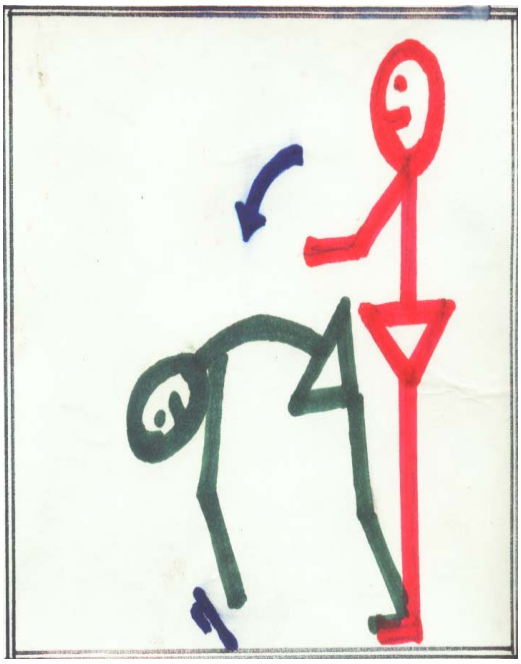
( ) 2 unable to pick up but reaches 2-5 cm (1-2 inches) from slipper

and keeps balnce independently.

( ) 1 unable to pick up and needs supervision while trying.

( ) 0 unable to try/needs assist to keep from balance or falling.

PICKING UP OBJECT FROM THE FLOOR FROM A STANDING POSITION



10. TURNING TO LOOK BEHIND OVER LEFT AND RIGHT SHOULDERS WHILE STANDING:

INSTRUCTION:Turn to look directly behind you over toward the left shoulder. Repeat to the right.Examiner may pick an object to look at directly behind to encourage a better twist turn.

( ) 4 looks behind from both sides and weight shifts well.

( ) 3 looks behind one side only other sideshows less weight shift.

( ) 2 turn sideways only but maintain balance

( ) 1 needs supervision when turning.

( ) 0 needs to assist to keep from losing balance or falling.

11.TURNING 360 DEGREES:

INSTRUCTIONS: Turn completely around in a full circle. Pause. Then turn a full circle in the other direction.

( ) 4 able to turn 360 degrees safely in a seconds or less.

( ) 3 able to turn 360 degrees safely one side only 4 seconds or less.

( ) 2 able to turn 360 degrees safely but slowly.

( ) 1 needs close supervision or verbal cuing.

( ) 0 needs assistance while turning.

12.PLACE ALTERNATE FOOT ON STEP OR STOOL WHILE STANDING UNSUPPORTED:

INSTRUCTION: Place each foot alternately on the step/stool. Continue until each foot has touched the step/stool four times.

( ) 4 able to stand independently and complete 8 steps in 20 seconds

( ) 3 able to stand independently and complete 8 steps in > 20 seconds

( ) 2 able to complete 4 steps without aid with supervision

( ) 1 able to complte > 2 sreps needs minimal assist

( ) 0 needs assistance to keep from falling/unable to try

13.**STANDING UNSUPPORTED ONE FOOT IN FRONT:**

INSTRUCTION: (DEMONSTRATE TO SUBJECT) Place one footdirectly in front of the other. If you feel that cannot place yourfoot directly in front, try to step far enough ahead that the heel ofyour forward foot is ahead of the toes of the other foot. (To score 3points, the length of the step should exceed the length of the otherfoot and the width of the stance should approximate the subject'snormal stride width.)

( ) 4 able to place foot tandem independently and hold 30 seconds.

( ) 3 able to place foot ahead independently and hold 30 seconds.

( ) 2 able to take small step independently and hold 30 seconds .

( ) 1 needs help to step but can hold 15 seconds.

( ) 0 loses balance while stepping or standing.

14. **STANDING ON ONE LEG:**

INSTRUCTION: Stand on one leg as long as you can without

holding on.

( ) 4 able to lift leg independently and hold > 10 seconds.

( ) 3 able to lift leg independently and hold 5-10 seconds.

( ) 2 able to lift leg independently and hold >= 3 seconds.

( ) 1 tries to lift leg unable to hold 3 seconds but remains standing

independently.

( ) 0 unable to try of needs assist to prevent fall.

TOTAL SCORE(Maximum = 56)

3.FUNCTIONAL STRENGTH TEST:

The functional strength test is used to determine the motor performance of the elderly people. It includes two sets of tests namely

1. Chair stand test- to assess the lower extremity muscle strength.
2. Arm curl test – to asses the upper extremity muscle strength.

L/E:Chair stand Test :

Equipment/set-up:

Straight-backed chair without arms (seats height approximately 17”). Chair is placed against wall or heavy object (plinth) to prevent it from moving during test.

A stopwatch is also required.

Starting Position:

Patient sitting in middle of chair with back straight and feet on floor.

Arms are crossed over chest.

Test Protocol:

The participant is instructed to rise to a full stand and return back to a fully

seated position after the signal ‘go” is given.

They are encouraged to complete as many full stands as possible Within a

30-second time limit.

The examiner demonstrates the test for the patient and allows a practice trial of 1 to 2 repetitions to ensure correct form.

One 30-second trial is performed and recorded.

Scoring:

The score is the number stands executed currently within 30 seconds. If the patient is more than half way up at the end of 30 seconds it is cunted as a full stand. Result obtained with this test maybe compared to age-related normative values listed bellow.

CHAIR STAND TEST (NUMBER OF STANDS)						
AGE / SEX	65-69	70-74	75-79	80-84	85-89	90-94
Normal Range of scores for men	12-18	12-17	11-17	10-15	8-14	7-12
Normal range of scores for women	11-16	10-15	10-15	9-14	8-13	4-11

Normal range of scores is defined as the middle 50 percent of each age group. Scores above the range would be considered “above average” for the age group and those below the range would be “below average”.

Adaptations if Hand use is required:

If the participant is unable to perform the task without use of hands during the practical trial, check “YES” for the “use of hands required?” question on the assessment form.

The test continues with the using the chair or their thighs to push off. If the participant uses their score cannot be compared with age-related normative values.

U/E:Arm Curl Test:

Equipment/set-up:

Straight-backed chair without arms (set height approximately 17”).

Dumbbells : 8 lbs for men and 5lbs for women.

A stopwatch is also required.

Starting Position:

Patient sitting in middle of chair with back straight and feet on floor. The weight is held in their dominant hand (use other side if dominant hand is impaired with the elbow in extension by the side of the patient’s torso, perpendicular with the floor. The wrist is initially positioned in neutral.

Test protocol:

The participant is required to turn palm upwards (supinate forearm) while curling the arm through full range of motion return to full extension .

In the downward position, the hand should have returned to the original starting position (wrist in neutral).

The participant is encouraged to perform as many curls as possible within 30 seconds.

The examiner demonstrates the test for the patient and allows a practice trail for 1 to 2 repetitions to ensure correct form. A 30-second trail is performed and recorded.

Examiner positioning can be adjusted if the participant is unable to maintain their upper arm still against their during the trail.

If patient form is problematic, the therapist may either kneel or sit next to the patient (the side which they are holding the weight) and place their fingers on the anterior aspect of the participant's upper arm to stabilize it from moving and ensure full range of motion is achieved (patient's forearm should squeeze examiner's fingers).

Scoring:

The score is the total number of curls executed correctly within 30 seconds. If the arm is more than half way up at the end of 30 seconds, it is counted as a curl.

Normal range of scores is defined as the middle 50 percent of each age group. Scores above the range would be considered 'above average "for the group and those below the range would be "below average".

Results obtained with this test may be compared to age-related normative values listed in the following table.

ARM CURL TEST (NUMBER OF CURLS)						
AGE / SEX	65-69	70-74	75-79	80-84	85-89	90-94
Normal range of scores for men.	15-21	14-21	13-19	13-19	11-17	10-14
Normal range of scores for women	12-18	12-17	11-17	10-16	10-15	8-13

Adaptation:

If the patient is unable to hold the dumbbell due to a medical condition

affecting the hand or wrist, a Velcro wrist weight may beused.

If the patient is unable to perform one (1) repetition with the appropriate weight, a lighter one may be substituted (ensure you note the change on the assessment form).

Remember, comparison with age related normative values are only possible if the standard testing protocol is followed.

4. MODIFIED CLINICAL TEST OF SENSORY INTERATION ON BALANCE:

This test allows for preliminary assessment of how well a patient can integrated various senses with respect to balance and compensate when one or more of those senses are compromised.

Sensory system involvement is modulated within various conditions as follows:

- Condition 1: Three sensory system available for balance (vision, vestibular, somatosensory).
- Condition 2: Vestibular and somatosensory available. Vision absent .
- Condition 3: Vestibular and vision available. Somatosensory compromised.
- Condition 4: Vestibular available. Vision absent, somatosensory compromised.

Equipment/set-up:

Foam pad (dense enough to avoid bottoming out) and a stopwatch required.

Starting position:

Patient stands with feet shoulder width apart and arms crossed over chest.

Protocol:

A 30-seconds trail is timed using a stopwatch. Time is stopped during a trail and recorded if:

a) Patient deviates from initial crossed arm position,
b) Patient opens eyes during an “eyes closed” trail condition, or
c) Patient moves feet (take a step) or requires manual assistance to prevent loss of balance.

A trail is successful if the patient is capable of maintaining the starting position independently for a period of 30 seconds.

A maximum of three (3) trails are performed for all conditions.Trails are performed until the patient either:

a) Successfully maintains the starting position for an entire 30-Seconds, or
b) Completes three, 30 second trails to the best of their ability.

Scoring:

- Conditions 1 thru 4: Record the time (in seconds) the patient was able to maintain the starting position (maximum of 30 seconds). Remember to the record the times for all trails.
- Total Score =
  (Average Time cond 1 + Average time cond 2)
  +
  (Average Time cond 3 + Average time cond 4)

12. PROCEDURE

The consent is obtained by explaining the procedure to the Individual.

Then the elderly people were assessed subjectively regarding the nature and history of falls and objectively assessed by using Balance Scale, Functional strength Test and Modified Clinical Test of Sensory Integration on Balance (CTSIB).

A total number of subjects with high risk of falls were selected.

They were allotted into 2 groups by simple randomization.

GROUP 1 consisting of 10 subjects received no treatment but was Provided with home safety advices.

GROUP 2 consisting of remaining 10 subjects received Balance Exercises along with home safety advices.

The treatment is given for 2 months of two sessions per day.

12.1. BALANCE EXERCISES:

Often as we age, our balance skills deteriorate.

For this reason it is important to do exercises to improve and maintain balance throughout our lives.

Balance exercises can be performed daily even at home.

We can start out with simple balance activities and increase the difficulty As the balance improves.

Improving the balance takes practice. One simple exercise can be done and modified as the skill level improves.

1. **FORWARD LEG LIFT:**

For this exercise – hold on to a table, wall, heavy chair or kitchen countertop with one hand before starting. Balance; try balancing by only a fingertip on the surface. If unsteady, ask someone to stand by to assist.

- Lift one leg slightly off the floor and hold it for five seconds.
- Repeat at least five times, and then switch to the other leg.
- Next try the exercise without holding on at all, arms at your sides.
- Once there is no need to hold on, try doing these exercise with eyes closed.

2. **FORWARD TOE TOUC**H:

- Place the feet about shoulder-width apart. Raise the hands to the shoulders with palms facing forward.
- Extend the right arm and place the left foot forward, pointing down with toes and touching the floor.
- Return to starting position and do the same with the opposite arm and foot. Repeat at least five times.

3. **STAND ON ONE LEG**:

- Place the feet about shoulder-with apart. Extend the arms straight the in front.
- Lift left leg and bend it back. Hold for five seconds.
- Repeat five times and switch legs.
- As improvement occurs, practice one-leg standing throughout the day . for example, stand on one leg while doing the dishes, reading the newspaper or watching TV. The more it is done, the more the stability will be improved.

ONE LEGGED STANCE

12.2. ADVANCED BALANCE EXERCISES

Advanced variation for three single-limb exercise were pictured and discussed below. This can be used to increase ankle strength and leg endurance, as well as an improved sense of balance directly over the feet.

There are all sorts of stability devices marketed widely (many of which we use for training variety) such as wobble boards, foam core rollers, Sit Fit discs, and stability balls. However, to enable the most people possible to perform the selected exercises, these exercises that require nothing more than ones own bodyweight, a few dumbbells (or gallon jugs filled with water), and perhaps a step, or stair.

1-LEG HOVER STEP-up

To perform the hover set-up, stand sideways (facing the long dimension of the step) on top of a study wide step or box roughly 6-10 inches in height, and dangle the non-working leg off the side of the step. Bend the knee and slowly lower the body until the unweighted foot is just above the floor. Pause for a second is given before the subject press back up to a standing position. Keep the weight over heel, and any discomfort was felt in the knee, lower the step height to make the movement smaller, press the hips back behind so the knee does not travel forward of the foot ADVANCED VARIATIONS: To make this exercise more challenging both For balance and for strength endurance:

- Hold a dumbbell in each hand

- Hover over the floor for anywhere up to 8-10 seconds to really recruit the quads and challenge the small muscles in the ankles and feet
- Increase the height of the step to add range of motion
- To simulate climbing through boulder fields, add a backpack to the Back
- Add repetitions or sets
- Hold a dumbbell only in one hand and change hands halfway through the exercise
- Avoid totally straightening the leg so the quads and gluteus stay constantly contracted.

1-Leg DB Squat

The 1-leg squat is an advanced version of the stationary lunge and It helps to: 1) stretch the hip flexors and quads ; 2) strengthen the entire Leg, from hips, to quads and hamstring, to ankles; 3) train each limb evenly, since one leg is doing more of the work at any given time; 4) develop balance and muscle control in the legs, especially while

performing the exercise slowly and with precision. To complete the 1-leg squat, place the rear foot up on a low box, stair or bench, and hold dumbbells in each hand. This can also be done with the foot on a porch, curb, or boulder, with a backpack on for added resistance. As the torso is lowered, the knees should be at approximately right angle . torso is kept as upright as comfortable, abs tight, and hips squared forward. Inhale while lowering and exhale while pressing back up. Drive the forward heel into the floor to active the large gluteus (buttocks) muscles. Complete the desired number of repetitions, rests, the then repeat with the other legs.

AVANCED VARIATIONS : to make this exercise more challenging both for balance and for strength endurance:

- Perform 15 – 20 repetition each leg
- Perform the exercise with weight only in one hand, and switch half way through the set
- Place the forward leg on a low unstable surface such as a pillow or cushion, or a narrow board such as a2x4. Pause for 1-2 seconds at the bottom abd do not rest at all at the top position
- Perform half-repetition: go ¾ of the way down and stop at1/4 of the way so that the middle half of the motion is got.

1-LEG 2 DB/1 DB DEADLIFT

- This exercise enhances balance as well as strengthens the gluteus, quads, ankles, and hips. Stand on one leg, with the other foot hovering just above the

floor behind for balace. Hold a dumbbell, dictionary, or gallon jug in each hand, for then bend down as low as possible toward

The floor with out rounding through (as shown) before lifting back up to vertical standing position. Relax the foot instead of gripping with the toes; the wider the surface area of the foot on the floor, the more stable will be felt.

ADVANCED VARIATIONS:

For more challenging variations:

- Perform this with a weight in only one hand, and switch the weight to the other hand half way through the set
- Pause at the bottom for 1-2 seconds so the muscles have to contract longer and harder
- Increase the weight (in each hand or offset – i.e 5 pounds in one hand and 15 in the other – so the obliques and core muscles get involved as well
- Stand with one foot on a weight plate or board (i.e. 2x4") anywhere from 1-8 inches thick and try to touch the floor from the elevated perch this increase the range of motion and challenges the gluteus maximally
- Perform additional repetitions or add a rowing motion with each as the individual stand upright,
- Driving upward quickly going to hop off the floor.

INCLUDUING THE EXERCISE IN A PROGRAM

These exercise are appropriate for all ages, although modifications are recommended for anyone may be recovering from a lower-body injury or who already knows that balance is a weakness. Start with the leg that might be weaker or more difficult to perform, and only complete on the domain (or stronger) leg the number of repetition that can be done successfully, with perfect form, on the weaker leg. Keep the non-working leg close to the floor until balance is gained; then try to increase the range of motion and/or resistance.

12.3. METHOD OF DATA COLLECTION:

Balance score is measured by administering the items of berg balance to the subjects.

Balance score is measured before the initiation of exercise, as a pre-test measurement.

Balance score score after 2months of treatment is measured as a post-test measurement

13. DATA COLLECTION :

Balance score is measured for all the subjects using berg balance scale

Balance score had been taken as pre-test measurement reading before the treatment.

At the end of 2months post-test measurement of balance score is taken again.

The collected data was put to suitable statistical treatment in order to verify the investigations of study

The independent test was used to compare the significance of difference in pre test and posttest values, of changes in balance scores between the two groups.

The test was used to compare the significant difference between pre-test and post-test values of balance scores.

14. Data analysis& interpretation

Datas of balance scores had been measured by using berg balance scale.

All the datas are fed into the computer and analyzed using statistical package (SPSS)

The scores obtained from the 2 group where compared using sample “t-test”. After analysis and comparision, result expresses in terms of mean, standard deviation and p-value at 95% level of confidence.

15. RESULTS:

Total number of sample, N=20 were taken for the study and grouped into 2 groups having 10 in each. (n=10).

The mean value of control group pre-test is 22.40 and that of post-test is 23.40. (Refer table 1)

The mean value of experimental group pre-test is 22.30 and that of post-test is 34.10. (Refer table 1)

There is a mean difference in both the control and the experimental group. However there is a significant improvement of mean value in experimental group.

'T' test have been done between the groups and the pre-test showed a 'T' value of 0.020 and the post-test showed a 't' value of 2.509. Paired Samples Test have been done to find out the group significance which showed a 'T' value of 3.354 in the control group with a significance of 0.008 and the experimental group showed a 'T' value of 7.754 with a significance of 0.000.

From the analysis it is show that the control group is statistically significant at 'P' value ($p<0.05$). However, experimental group showed much significance with 'P' value ($p<0.001$).

16. DISCUSSION:

Falls are among the major causes of morbidity in the geriatric population. Falling is not only a problem in its own right, its often a marker for frailty and falls may be predictors of death as well as of many indirect causes.

There are numerous ways to reduce the frequency of falls and thereby to minimize the complication of falls. Some of the methods of falls prevention includes- exercises (particularly training to improve balance), safety-related skills and behavior, environmental hazard reduction, monitoring and adjusting medications, exercise programs incorporating gait and balance training; advice on appropriate use of assistive devices; review and modification of medications; evaluation and treatment of postural hypotension; and cardiovascular assessment and treatments.

Although other treatment are available, I have selected the administration of balance exercises and counseling regarding home safety measurements to the experimental group and only counseling to the control group.

The treatment and effects may depend on various factors such as

1. Patient's age.
2. Patient's level of co-operation
3. Patient's level of physical functioning.
4. Duration of the treatmaent.

Including more number of subjects can do the study more extensively one. The duration of the treatment can also be increased and include correction of abnormal gait

parameters and other cardiovascular disorders leading to falls in the elderly such as syncope, postural hypotension and arrhythmias.

The feet can be given more attention because deformities, painful lesions (calluses, bunions and ulcers) and poorly fitted, inappropriate or worn out shoes are common and contribute to instability leading to falls.

The study was conducted on the samples having history of falls. They were selected by the Random Samples technique in which they divided into two groups. Group 1 remained as control group and Group 2 is given with balance exercise training.

As by the result of the ‘P’ value, the control group has a value of ($p<0.05$) and the experimental group has a value of ($p<0.001$) suggesting that the experimental group is more effective than that of control group.

17. CONCLUSION:

The intervention for falls prevention may vary depending on the frequency and causes of falls and may also vary with various physiatrists. My study revealed that the experimental group, which received balance exercise training along with home safety measurements showed better improvement in beg balance test.

A significant reduction in falls was among this group. So the alternate hypothesis (H1) is accepted.

The control group, which received only, counselling regarding home safety measure, did not show any signiificant improvent while comparing with the experimental group. So the null hypothesis (HO) is rejected.

The control group when compared with pre tesst and posttest measurements shows a slight improvement, which might be due the counseling that is provided.

Thus, the balance exercise training is effective in improving the balance in elderly with history of falls and showed significant reduction in the occurrence of falls among them.

18. REFERENCES:

1. Horn brook MC, stevens vj, wingfield DJ, et al. preventing falls among community- dwelling older persons: results from a randomized trail. Gerontologist 1994;34:16-23.
2. Nelson RC, Amin MA.Falls in the elderly. Emerg Med Clin North Arm 1990;B:309-324.
3. Ochs AL, Newberry J, Lenhardt ML, Harkins SW.Netural and vestibular aging associated with falls. In Birren JE, Schaie KW,eds. Handbook of the psychology of aging. New York, NY: Van Nostrand Reinhold; 1985:378-399.
4. Prudham D, Evans JG. Factors associated with falls in the elderly: a community study. Age Ageing. 1981; 10:141-146.
5. Sattin Rw . Falls in the
6. Tinetti ME, speechley M, Ginter SF. RISK factors for falls among elderly persons living in the community. N Engl J Med 1988;319 : 1701 -1707
7. Cambell AJ, Borrie MJ, Spears GF, et al. circumstances and consequences of falls experienced by a community population 70 years and over during a prospective study. Age ageing 1990;19 : 136 - 141
8. Tinetti ME, Baker DI, McAvay G, et al. A multifactorial intervention to reduce the risk of falling among elderly people living in the community. N Engl J Med 1994; 331 :821 – 827

9. Ashely MJ, Gryfe CI, Amies A. A longitudinal study of falls in an elderly population, II: some circumstances of falling. Age ageing 1977;6 :211 – 220.
10. Nickens H. Instrinsic factors in falling among the elderly. Arch Intern Med 1985; 145 : 1089 – 1093.
11. Blake AJ, morgan K, Bendal MJ, el al. Falls by elderly people at home: prevalence and associated factors. Age ageing 1988;17 : 365 – 372.
12. Maki BE, Holliday PJ, Topper AK. Fear of falling and postural performance in the elderly. J gerontol 1991; 46 :M123 – M131.
13. Overstall PW, Exton –Smith AN, Imms FJ, Johnson AL. Falls in elderly related to postural imbalance. Br Med J 1977; 1 :261 – 264.
14. Tinetti ME, speechley M. Preventation of falls among the elderly. N engl J Med 1989; 320 : 1055 – 1059.
15. Duncan PW, studenski S, Chandler J, Prescott B. Functional reach; predicitive validity in a sample of elderly male veterans. J Gerontol 1992 47 :M93 – M98.
16. Tang PF, woolllacott MH. Inefficient postural reponses to unexpected slips during walking in order adults. J Gerontol A Biol Sci Med Sci 1998; 53 : M471 – M480.
17. Woollacott MH, shumway- cook A. Changes in posture control across the life span: a systems approach. Phys ther 1990;70 : 799-807

18. Woollacott MH, shumway- cook A, Nashner LM. Aging and posture control: changes in sensory organization and muscular coordination. Int J aging Hum Dev 1986; 23 :97 – 114.
19. Brown LA, shumway- cook A, woollacott MH. Attentional demands and postural recovery: the effects of aging. J Gerontol A Biol Sci Med Sci 1999;54 :M165-M171.
20. Kerr B, condon SM, McDonald LA. Cognitive spatial processing and the regulation of posture. J Exp Psychol Hum Percept Perform 1985;11 :617 – 622.
21. Mcllroy WE, Norrie RG, Brooke JD, et al. Temporal properties of attention sharing consequent to disturbed balance. Neuroreport 1999; 10 : 2895 – 2899.
22. Teasdale N, Bard C, LaRue J Fleury M. On the cognitive penetrability of posture control. Exp aging Res 1993; 19 : 1 – 13.
23. Woollacott M, Shumway – cook A, Attention and the control of posture and gait: a review of an emerging area of research. Gait posture 2002; 16 :1 – 14.
24. Bloem BR, Steijns JA, Smits – Engelsman BC: An update on falls. Curr opin neurol 2003; 16:15-26.
25. Prevention AGSPF: guideline for the preventation of falls in older persons. American geriatrics Society. British Geriatrics Society, and Americal Academy of Orthopaedic surgeons panel on falls prevention.
J Am geriatr Soc 2001, 49:664 – 672.

26. Network HE: what are the main risk factors for falls amongst older people and what are the most effective interventions to prevent these falls?
27. Shumway-Cook A, woollacott MH: Motor control: theory and pratical appilcations. Philadephia, wiliam and wilkins; 2001
28. Gillespie LD, Gillespie WJ, Robertson MC, Lamb SE, Cumming RG, Rowe BH:Interventions for preventin falls in elderly people.
Cochrane database syst Rev 2001, CD000340.
29. Close J, Ellis M, Hooper R, Glucksman E, Jackson S, swift c: Preventation of falls in the elderly trial (PROFET): a randomised controlled trial.
Lancet 1999, 353: 93 – 97.
30. Day L, Fildes B, Gordon I, Fitzharris M, Flamer H, Lord S: Randomised factorial trail falls preventation among older people living in their own homes.
BMJ 2002, 325:128.
31. Robertson MC, Campbel AJ, Gardner MM, Devin N: Preventing injuries in older people by preventing falls: a meta-analysis of individual-level data. J Am geriatr Soc 2002, 50: 905 – 911.
32. WolfSL,BarnhaRT hx, Kutner N, McNeey E, Cooger X, Xu T:
Reducing fraity and falls in oder person:an investigation of Tai chi and computerized balance training. Atanta FICSIT techniques .J Am Geriatr Soc 1996, 44:489-497
33. Bakeer SP, Harvey AH: Fa injuries in the ederly.
Clin Geriatr Med 1985,1(3):501-512.

34. Moreland J, Richardson j, Chan DH, O'Neill J, Belisimo A, Grum RM, Shanks : Evidence-based guidelines for the secondary prevention of falls in older adults.
Geronotoogy 2003,49(2):93-116

35.Maki BE, Holiday PJ, Topper AK: Fear of falling and postural performance in the elderly. J Gerontol 1991, 46(4):M123-31.

36. Wolfon L, Judge J, whipple R, King M: Strength is a major factor in balance, gait, and the occurrence of fals. J gerontol A Biol Sci Med Sci 1995, 50 spec No: 64 – 67.

37. Commodore DL: falls in the elderly population: a look at incidence, risks, healthcare costs, and preventive strategies. Rehabil Nurs 1995, 20(2): 84 – 89.

38. RANDAL L. BRADDOM Physical medicine & rehabilitation second edition – W.B. saunders compnay.

39. JOEL A. DELISA – Physical medicine and rehabilitation principles and practice – fourth edition – Lippincott wiliams & Wilkins.

TABLE 1.

TABLE SHOWING MEAN, STANDARD DEVIATION, T- TEST AND SIGNIFICANCE FOR BERG BALANCE SCORES WITH IN THE GROUP

BERG BALANCE SCORE	PRE TEST		POST TEST		'T'-TEST	SIGNIFICANCE
	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION		
CONTROL GROUP	22.40	11.147	23.40	11.296	3.354	0.008*
EXPERIMENTAL GROUP	22.30	11.595	34.10	7.310	7.554	0.000*

*(P<0.05) statiscally significant

**(P<0.001) statiscally significant.

TABLE 2.

TABLE SHOWING MEAN, STANDARD DEVIATION, T- TEST AND SIGNIFICANCE OF PRE- TEST BERG BALANCE SCORES BETWEEN THE GROUP

PRE TEST	MEAN	STANDARD DEVIATION	T-TEST	SIGNIFICANCE
CONTROL GROUP	22.40	11.47	0.020	0.985
EXPERIMENTAL GROUP	22.30	11.595		

*(P>0.05) statiscally nit significant

TABLE 3.

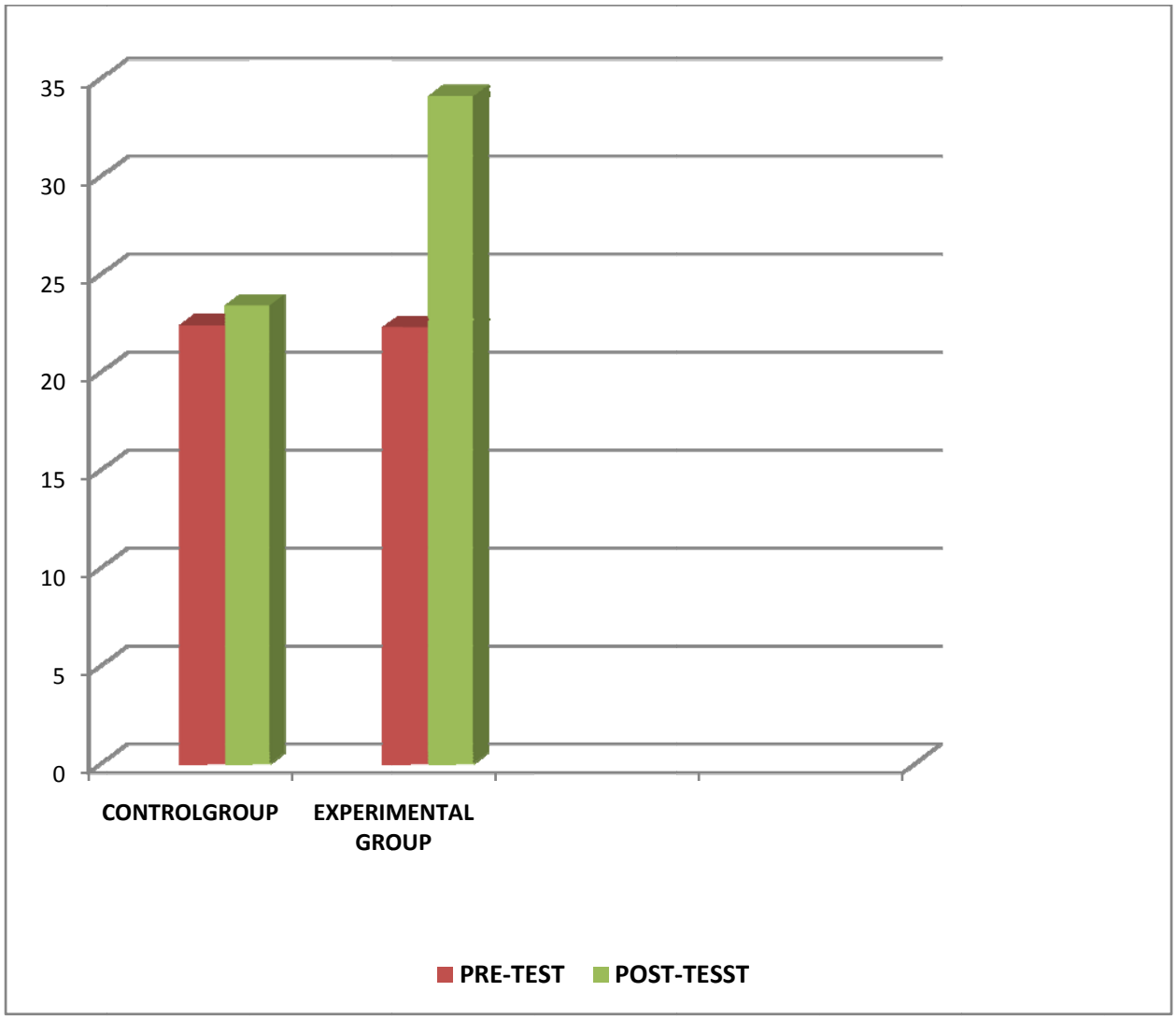
TABLE SHOWING MEAN, STANDARD DEVIATION, T- TEST AND SIGNIFICANCE OF POST- TEST BERG BALANCE SCORES BETWEEN THE GROUP

POST TEST	MEAN	STANDARD DEVIATION	T-TEST	SIGNIFICANCE
CONTROL GROUP	23.40	11.296	2.509	0.022*
EXPERIMENTAL GROUP	34.10	7.370		

*(P<0.05) statically nit significant

DIAGRAM 1

COMPARISION BETWEEN PRE AND POST TEST IN BERG BALANCE SCORE



ANNEXURE-1

PATIENT CONSENT FORM

I hereby give my consent for image or other clinical information relating to my case to reported in the project work done by Dr……...

I understand that my name and initials will not be published and that effort will be made to conceal my identity, but that anonymity cannot be guaranteed.

I also understand that the general public may see the material.

I give permission for images of my face or distinctive body markings to be published and recognize that I might therefore be identifiable even though my name and initials will not be published**.**

_____ _____

Name of the patient **patient's date of birth**

_____ _____

Signature of patient (or signature of **Date**

The person giving consent on behalf

of the patient)

ANNEXURE-2

ASSESSMENT FORM:

Name:

Age:

Sex:

History of falls:

- Cause of fall:
- Frequency of fall:

Home living Environment:

- **Physical layout**

__ stairs inside home __ stairs to get into home__ Bathtub __ Grab bars in bathroom __ Ramps __ Bright lighting__ Nightlights__ Bath chair or bench __ Non- skid bath mats__ Hills around yard __ shower stall__ Hand held showerhead__ raised toilet seat__ Slick/slippery floors__ Uneven ground__ Electric cords on floor

- **ADL independence:**

OBJECTIVE ASSESSMENT:

Berg Balance scale:

Score:

Interpretation:

Functional Strength Test:

- ❖ L/E (chair stand test):
  - Use of hands required? __YES __NO
  - Number of repetitions completed in 30 seconds:
- ❖ U/E (Arm Cru Test):
  - Arm used: __Left __Right
  - Weight:
    51bs (Female): __
    81bs (male):__
  - Number of repetitions completed in 30seconds:

Modified clinical test of sensory integration on balance (CTSIB):

- ❖ Condition 1: Eyes open, firm surface

  - Total time:__/30 sec
  - Total time:__/30 sec
  - Total time:__/30 sec Mean score_____

- ❖ Condition 2: Eyes open, firm surface

    - Total time:__/30 sec
    - Total time:__/30 sec
    - Total time:__/30 sec Mean score_____

- ❖ Condition 3: Eyes open, firm surface

    - Total time:__/30 sec
    - Total time:__/30 sec
    - Total time:__/30 sec Mean score_____

- ❖ Condition 4: Eyes open, firm surface

    - Total time:__/30 sec
    - Total time:__/30 sec
    - Total time:__/30 sec Mean score_____
      TOTAL SCORE___/120sec

Observation a gait:

- ❖ Deviations observed
  () No significant deviations observed.
  () Trunk lateral lean/ Forward trunk flexion.
  ()Hip hiking/Jip circumduction.
  ()Trendelenburgy R___L___.
  ()Knee hyperextension R___L____.
  ()Foot drop R___L___.
  () Decreased gait sped.
  () widened base of support.

ANNEXURE-3

MASTER CHART

Master Chart for Berg Balance Scores

S.NO	CONTROL GROUP				EXPERIMENTAL GROUP			
	AGE	SEX	PRE TEST	POST TEST	AGE	SEX	PRE TEST	POST TEST
1	88	F	6	8	86	F	18	33
2	81	F	14	14	82	F	29	39
3	84	F	36	37	83	F	5	27
4	77	F	8	8	79	F	31	41
5	71	F	38	40	73	F	14	28
6	72	F	32	32	74	F	24	32
7	69	F	19	17	69	F	9	24
8	66	F	25	25	66	F	37	44
9	65	F	19	9	68	F	39	44
10	65	F	27	29	65	F	17	29

ANNEXURE-4

BERG BALANCE SCORE SHEET

Name_____ **Date**_____

ITEM DESCRIPTION	SCORE(0-4)
1) Sitting to standing	_____
2) Standing to unsupported	_____
3) Sitting to unsupported	_____
4) Standing to Sitting	_____
5) Transfer	_____
6) Standing with eyes closed	_____
7) Standing with feet together	_____
8) Reaching forward without stretched arm	_____
9) Retrieving object from floor	_____
10) Turning to look behind	_____
11) Turning 360 degrees	_____
12) Placing alternate foot on stool	_____
13) Standing with one foot in front	_____
14) Standing on one foot	_____
TOTAL	_____

ANNEXURE-5

EVIDENCE ON FALLS PREVENTION

The following tables summarizes some of the finding from these studies.

INTERVENTION	FINDINGS	REFERENCE
Exercise and cognitive behavioral therapy	No difference in time to first falls	Reinsch et al., 1992
Combination of medication adjustment, behavioral instructions and exercise program	At 1 year RR for falls 0.69; no significant on injurious falls	Tinetti et al., 1994
Various exercise programs	RR for falls among general exercise group 0.90, including balance 0.83, no significant effect on injurious falls.	FICSIT 1995
Strength and endurance training	Relative hazard for falling 0.53.	Buchner at al., 1997
Weight bearing exercise	Number of falls over 2 years not significant but difference in rate for months 12-18 was significant	McMurdo et.al., 1997

INTERVENTION	FINDINGS	REFERENCE
Home based strength and balanced exercise program	RR for falls at 2 years 0.69. RR for moderate/ severe injury 0.63	Campbell et. Al 1999
Home visit by occupational therapist for environmental assessment and modification	Decrease in number of persons falling amount prior faller, RR of fall was 0.64.	Cumming et al 1999
Falls prevention strategies in nursing homes	Only two third completed 6-month interventation no difference in fall rates.	McMurdo et.al 2000
Nurse delivered home exercise program	Significant decrease in number of falls and serious injurious falls.	Robertson et al., 2001
Multiple strategies in residential card facilities (education, environmental modifications reviweing drug regimen, etc)	Adjusted OR for falls 0.49; adjusted incidence rate for falls .0.60	Jensen et al., 2002